

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the reasons that follow.

Dependent claim 12 has been amended. Applicant submits that the amendment to claim 12 has been made to overcome the indefiniteness rejection under 35 U.S.C. § 112 and therefore places the claims in better form for consideration on appeal, per 37 C.F.R. § 1.116(b)(2). Entry and consideration of this amendment is respectfully requested.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1-13 are now pending in this application.

Rejection under 35 U.S.C. § 112

Claim 12 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claim 12 has been amended to overcome this rejection. Withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. § 102

Claims 1, 2, 7-11, and 13 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,791,558 (hereafter “Hoshino et al.”). This rejection is respectfully traversed.

Claim 1 recites a heating device for a motor vehicle that includes an internal combustion engine and an engine coolant circuit, the heating device comprising a housing defining a heat generation chamber, a rotor mounted in the heat generation chamber for rotation on a drive shaft, a cooling jacket defining a cooling chamber in heat exchange relationship with the heat generation chamber, the cooling chamber being adapted for circulating the engine coolant and including a coolant inlet and a coolant outlet, and a pump wheel driven by the drive shaft arranged in the cooling chamber for circulating the coolant.

Hoshino et al. discloses a vehicle heating system that includes a heat-generating chamber 14 adjacent to a water jacket WJ₂. See Hoshino et al. at col. 6, lines 44-48. A rotor 15 is disposed within the heat-generating chamber 14 and is press-fitted to a shaft 11. See Hoshino et al. at col. 6, lines 44-52. An impeller for circulating water is fixed to a trailing end of the shaft 11. See Hoshino et al. at col. 6, lines 35-36; col. 7, lines 42-50. Hoshino et al. discloses that shearing caused by the rotor 15 heats silicone oil within the heat-generating chamber 14. See Hoshino et al. at col. 7, lines 46-50.

However, the impeller 12 of Hoshino et al. is not arranged in a cooling chamber “in heat exchange relationship with the heat generation chamber,” as recited by claim 1. Hoshino et al. discloses that heat generated in the heat-generating chamber 14 is heat-exchanged to water circulated in water jacket WJ₂. See Hoshino et al. at col. 7, lines 51-53. Because the impeller 12 is not arranged in the water jacket WJ₂, which exchanges heat with the heat-generating chamber 14, the impeller 12 is not arranged in a cooling chamber “in heat exchange relationship with the heat generation chamber.” Therefore, Hoshino et al. does not disclose all of the features recited by claim 1.

Figure 1 of Hoshino et al. shows that the impeller 12 is arranged at the end of the shaft 11 in an axial direction away from the water jacket WJ₂. As disclosed by Hoshino et al., rotation of the impeller 12 causes water to circulate in WJ₁ and then be forced down a passage to water jacket WJ₂. See Hoshino et al. at col. 7, lines 42-44, and Figure 1. However, as discussed in the example on page 7, lines 1-19, of Applicant’s specification, a pump wheel disposed in a cooling chamber can be used to suck coolant in from a cooling duct and convey the coolant radially outward into cooling ducts to provide a uniform flow of coolant over a cooling jacket, thus relieving a coolant pump from performing this duty of conveying coolant radially to the cooling ducts. Therefore, the device of Hoshino et al. does not function in the same way as the device recited by claim 1.

Applicant’s device provides advantageous improvements over prior art devices. For example, as discussed on page 2, line 12, of Applicant’s disclosure, a coolant-side pressure drop of a heating device can be minimized by providing a pump wheel in a cooling chamber through which coolant flows. The arrangement of the pump wheel in the cooling chamber permits a streamlined flow of coolant through the cooling chamber and an effective

transmission of heat to the coolant. A pump wheel provides low cost structure that can be driven via a drive shaft to provide a favorable drive efficiency. Furthermore, the placement of a pump in a cooling chamber provides a heating device with a compact design in the axial direction of the heating device.

For at least the reasons discussed above, withdrawal of this rejection is respectfully requested.

Claim 2 depends from claim 1 and is allowable over Hoshino et al. for at least the reasons discussed above. Claim 2 further recites “wherein the cooling jacket has a central protuberance which is arranged coaxially to the drive shaft and outside which the pump wheel is arranged and inside which a shaft stub of the drive shaft is arranged.” As shown in Figure 1 of Hoshino et al., impeller 12 is fixed to an end of shaft 11 so that both the impeller 12 and the shaft 11 extend into a pump chamber 4. Therefore, both the stub of the shaft 11 and the impeller 12 are arranged on the same side of a central protuberance, whether the central protuberance is considered to be the mechanical seal 6, part of the housing, or another part of the device of Hoshino et al. Thus, Hoshino et al. fails to disclose all of the features of claim 2. Withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. § 103

Claims 3-5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoshino et al. in view of U.S. Patent No. 4,308,994 (hereafter “Perhats”). This rejection is respectfully traversed. Perhats discloses a vehicle circulation system that includes a radiator 1 with a hot water circuit 2 and a cold water return circuit 3; hot water transmitting conduits 6, 8; and a circulation device 7 interposed between hot water transmitting conduit 6 and hot water transmitting conduit 8. See Perhats at col. 6, lines 1-4, 17-21. Perhats discloses that the circulation device 7 is an integrated pump motor device that includes an impeller blade 16 that revolves due to the magnetic interaction of yoke 20 and the magnetic base 23 of the impeller blade 16. See Perhats at col. 6, lines 63-68. However, the impeller blade 16 is not arranged in a coolant chamber because the circulation device 7 is arranged within the hot water transmitting circuit of the circulation system. Therefore, Perhats does not cure the deficiencies of Hoshino et al. Withdrawal of this rejection is respectfully requested.

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hoshino et al. in view of Perhats and further in view of U.S. Patent No. 6,388,346 (hereafter "Lopatinsky et al."). This rejection is respectfully traversed. Lopatinsky et al. fails to remedy the deficiencies of Hoshino et al. discussed above in regard to independent claim 1, from which claim 6 depends. Withdrawal of this rejection is respectfully requested.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

By


Richard L. Schwaab
Attorney for Applicant
Registration No. 25,479

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FOLEY & LARDNER LLP
Customer Number: 22428
Telephone: (202) 672-5414
Facsimile: (202) 672-5399